Frances K. McSweeney (1969–1974)

THE MATCHING LAW ILLUSTRATES THE INFLUENCE OF THE HARVARD PIGEON LAB

Skinner, Herrnstein, and Baum were the faculty members associated with the Harvard Pigeon Lab during the time that I worked there. Skinner was accessible to students, but was not involved in the daily running of the lab. Herrnstein and Baum ran the lab and conducted the weekly discussions of research (the pigeon staff meetings). It was an exciting time because research on the matching law was in full swing. The lab was noisy with the clicking of the electromechanical relay equipment and the occasional scream of a graduate student who completed a circuit between a power bar carrying 110-V AC current and either a ground or a power bar carrying 28-V DC current.

Those working in the lab were also influenced by other members of the Harvard faculty. We were introduced to their work during the proseminar, a course that was required of all incoming graduate students. Herrnstein summarized the purpose of this course during our 1st day as graduate students. The purpose, he said, was to forge us into a unit through adversity, to allow the faculty to evaluate us relative to each other, and possibly to teach us some psychology. We spent an anxious evening discussing whether other schools would still be interested in our application.

The intellectual influence of the Harvard Pigeon Lab can be clarified by examining themes that appear in the work of the many people who were trained there. I'll use the matching law (Baum, 1974; Herrnstein, 1970) to illustrate these themes because it was the major topic of research when I was there. In many ways, the matching law represented both a continuation of work that had gone before and a profound departure from earlier work. The law also illustrates the influence of other Harvard faculty members. For example, the power law form of the generalized matching law strongly resembles S. S. Stevens' power law description of the psychophysical function.

Empirical Laws

With some exceptions (e.g., Killeen, Staddon), researchers trained at Harvard have formulated empirical generalizations about behavior rather than comprehensive theories. The matching law provides an example because it summarizes a large body of research but contains little theoretical explanation for these behavioral regularities. Additional empirical generalizations can be found in the work of many others trained in the lab (e.g., Fantino, 1969; Logue, 1988; Mazur, 1984; Neuringer, 1992; Williams, 1983). This empirical emphasis was a continuation of earlier work by Skinner and others. In my opinion, the empirical approach provides the most reasonable method for expanding our present knowledge. Given the limitations of our knowledge, the data do not adequately constrain elaborate theoretical speculation about behavior. The empirical approach, however, also places our field at odds with heavily theoretical areas of psychology (e.g., cognitive) and may have isolated and handicapped us in the competition with other fields for grant funding.

Large, Orderly, and General Effects

Researchers trained in the Harvard Pigeon Lab often study behavioral effects that are large, orderly, and general (e.g., Fantino, 1969; Logue, 1988; Mazur, 1984; Rachlin, 1973; Williams, 1983). Smaller, less orderly effects have a disconcerting way of vanishing when they are most needed (e.g., when you're trying to get tenure). Large and orderly effects also lend themselves to the precision of mathematical description. The matching law is an obvious example. It provides a relatively accurate mathematical description of a large effect. It is also highly general, describing the behavior of many different species, responding in many different ways for many different reinforcers. The only time that my own data failed to conform to this law, Herrnstein pointed out that I was using a changeover delay (COD) that was too short. Sure enough, lengthening the COD cured the problem.

This particular approach to studying behavior has been criticized. For example, a famous psychologist, trained in a more theoretically oriented discipline, once told me that large and orderly behavioral effects are not necessarily theoretically important. Although I agree that occasionally a relatively small and fragile effect may have theoretical importance (e.g., blocking in classical conditioning; e.g., Kamin, 1969), I do not agree that a large and orderly effect can ever be theoretically unimportant. If one's theoretical goal is to describe and predict behavior, then one should concentrate on describing and explaining the large effects.

Relative Measures

While at Harvard, many of us learned that relative measures of behavior are usually more orderly and sensitive than absolute measures (e.g., Neuringer, 1967). As an example, the matching law has relative dependent and independent variables. Herrnstein argued that relative measures are more orderly because they control for many of the variables that create noise in the data. For example, if an animal's level of deprivation varies somewhat from session to session, then those changes will confound the effect of an independent variable (e.g., rate of reinforcement) when absolute response-rate measures are taken in different sessions. In contrast, fluctuations in deprivation will cancel when the effect of an independent variable is assessed by relative measures (e.g., the relative rates of responding for different rates of reinforcement within a single session).

Molar Measures

Although there are exceptions (e.g., Shimp, 1969), students trained at Harvard usually favor molar over molecular dependent and independent variables. Molar measures are taken over relatively long time periods; molecular measures are taken over smaller intervals. The matching law uses molar measures because its terms are measured over the entire experimental session. The emphasis on molar measures was heavily criticized when it was introduced (and today, e.g., Dinsmoor, 2001) because it represented a departure from Skinner's earlier use of cumulative records. Our field will probably turn more and more to molecular measures as modern computer technology makes it easier to collect such data. However, even if all of the causes of behavior eventually prove to be molecular, the discovery of molar regularities in behavior will remain an important contribution of the Harvard Pigeon Lab. At the very least, molar regularities provide data for theories to explain.

Conclusion

I learned a great deal from my time in the Harvard Pigeon Lab. I've cited the work of Herrnstein and Baum because the matching law illustrates many relevant themes. I should also note that Skinner was generous with his time and was always available for a chat with students. One lesson that I learned particularly well was how to hurdle. Herrnstein often commented that the faculty didn't know how to teach students anything, but they did know how to place hurdles between students and their degrees. One of my fellow students observed that, by this thinking, students should be required to climb William James Hall (12 floors or so) rather than to take prelimary examinations. Herrnstein agreed and commented that the results would also be easier to grade. By Herrnstein's thinking, students who succeeded at Harvard would learn how to overcome obstacles. Most of us learned that lesson quite well.

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QUALITATIVELY DIFFERENT REINFORCERS IN THE HARVARD PIGEON LAB

I owe my place in the Pigeon Lab at Harvard directly to Peter Killeen and to the anonymous graders of the qualifying exams (the notorious prelims) administered at the end of my 1st year as a Harvard PhD student. To Peter because he invited me to join his newly established lab at Arizona State University when I was a junior there and allowed me to collaborate with him in research on a qualitatively different reinforcer: light. He was mentor as much as collaborator and encouraged me to put Harvard in my sights. No doubt his role in recommending me made a large difference to my admission. And to the anonymous graders because passing the exams made it possible for me to stake out a place in the lab. At the time, there was a strict policy of commencing one's research only after the exams had been taken (and passed).

My 1st year at Harvard brought me into contact with Dick Herrnstein, whose graduate seminar, Motivation and Action, was to prove pivotal to my subsequent research. My adviser in that year was Billy Baum, distinguished by lengthy beard and wall-covering poster of Maher Baba, and, like Dick, degrees only from Harvard. Although Peter had first acquainted me with the matching law, taking Dick's seminar and assisting Billy in his undergraduate learning course drove the acquaintance deeper and to the point of inspiring research projects I could call my own. I recall Dick mentioning all sorts of ways in which the matching law could be extended (on both sides of the equation) and practically begging that matching be studied in an experimental arrangement involving choice between different kinds (qualities) of reinforcers.

The seventh-floor (William James Hall) lab that I entered in my 2nd year was storied, not least because of the list of those who had completed dissertations there (and in the precursor labs elsewhere on campus) while using virtually the same equipment that was still in place, and the fact that Fred Skinner's office was adjacent. He had retired before I arrived but was still a frequent presence (in his office but never in the lab) and, as the object of visits from notable guests and media from around the world, very much a celebrity. The lab proper occupied as many as 10 rooms of various size, including colony rooms for individually housed pigeons and rats (and one presiding crow), rooms containing experimental chambers, and rooms housing the apparatus for experimental control—rows of relay racks that reached floor to ceiling. Later a new gadget—a PDP-8® minicomputer—made its appearance in the lab and, in tandem with the programming language known as SKED®, revolutionized the way we conducted research. The rooms containing chambers were linked to those containing the control equipment by bundles of cables that wound their way through walls, above the ceiling, and along the floor. The whole scene gave the distinct impression of wire world gone amok. When animals were active in all the chambers, there was an attendant cacophony of click-clacking, whirring, buzzing, and so forth that added to the head-spinning sense of order on the verge of welter.

My first task was to self-learn the relay circuitry (Peter's lab had been Digibit based); a rite of passage, it seemed. Electrical shorts and more than a few shocks were part of the